

CLAIMS

What is claimed is:

1. A method for reducing residual stress of a nickel-base superalloy article
5 comprising about 40-70% of gamma prime phase and having a gamma prime solvus temperature, comprising the steps of:
 - a) providing a furnace having a furnace tolerance temperature;
 - b) super-solvus heat treating the superalloy article to only about the
gamma prime solvus temperature plus the furnace tolerance temperature; and
 - 10 c) holding at the super-solvus heat treatment temperature of b) for about 0.25-2 hours, wherein the heat treated superalloy article has reduced residual stress.
2. The method of claim 1, wherein the super-solvus temperature of b) is about
the gamma prime solvus temperature plus the furnace tolerance temperature plus
15 about 5°F.
3. The method of claim 1, wherein the superalloy article is made of Rene'88DT.
4. The method of claim 1, wherein the superalloy article is a seal or a high
20 pressure turbine disk.
5. The method of claim 1, wherein step c) comprises a hold of about 1-2 hours.
6. The method of claim 1, further comprising quenching the superalloy article.
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7. A method for reducing residual stress of a nickel-base superalloy article
comprising about 40-70% of gamma prime phase and having a gamma prime solvus temperature, comprising the steps of:
 - a) super-solvus heat treating the superalloy article only about 5-40°F
30 above the gamma prime solvus temperature; and
 - b) holding at the super-solvus heat treatment temperature of a) for about 0.25-2 hours and quenching to ambient temperature, wherein the heat treated superalloy article has reduced residual stress.

8. The method of claim 7, further comprising quenching the superalloy article, followed by subsolvus precipitation heat treatment.
9. The method of claim 7, wherein the super-solvus heat treatment is about 15-40°F above the gamma prime solvus temperature.
10. The method of claim 7, wherein the super-solvus heat treatment is about 25-30°F above the gamma prime solvus temperature.
11. The method of claim 7, wherein the super-solvus heat treatment is about 25°F above the gamma prime solvus temperature.
12. The method of claim 7, wherein the super-solvus heat treatment is about 15°F above the gamma prime solvus temperature.
13. The method of claim 7, wherein the super-solvus heat treatment is about 5°F above the gamma prime solvus temperature.
14. The method of claim 7, wherein the superalloy article is made from Rene'88DT and the super-solvus heat treatment temperature is about 2060-2070°F.
15. The method of claim 14, wherein the super-solvus heat treatment temperature is about 2065°F.
16. The method of claim 14, wherein the super-solvus heat treatment temperature is about 2070°F.
17. The method of claim 7, wherein the superalloy article is a seal or high pressure turbine disk.
18. The method of claim 7, comprising a hold of about 1-2 hours.
19. The method of claim 18, comprising a hold of about 1 hour.